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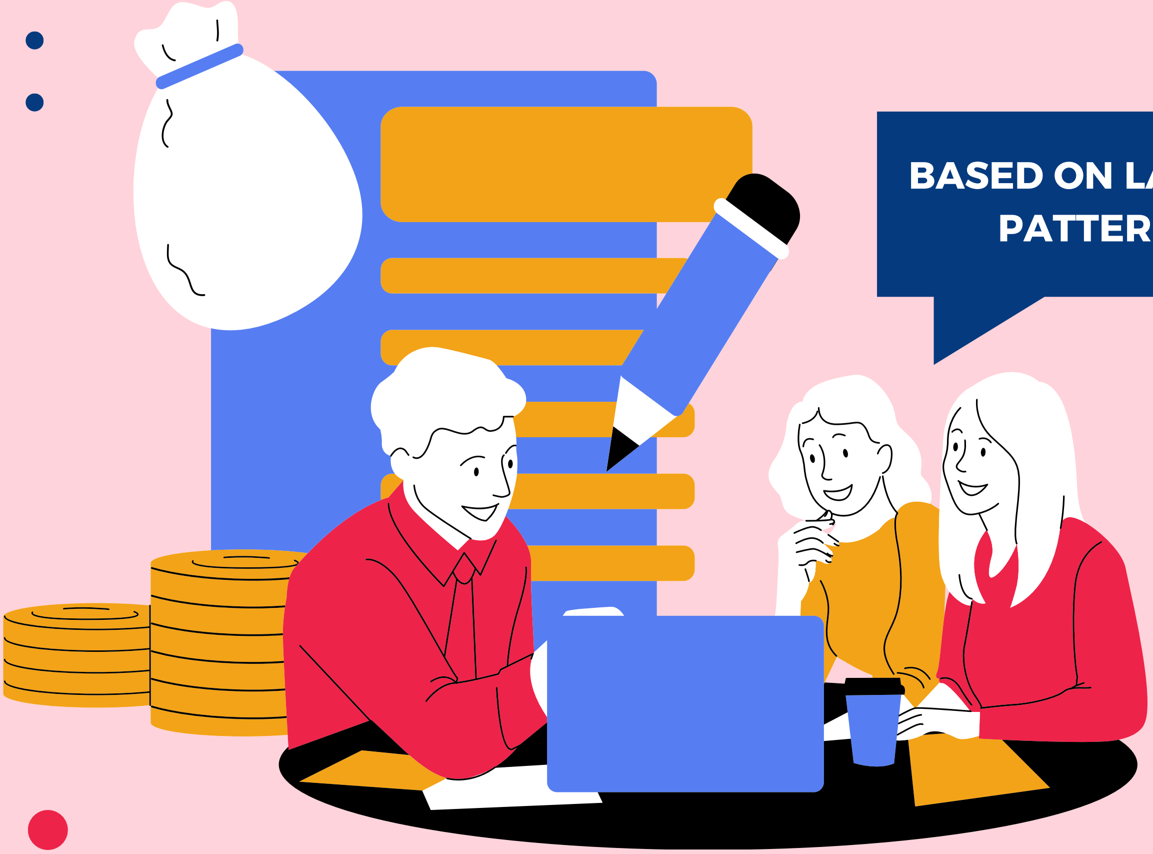
NO. 1 EDUCATIONAL RESOURCES

CUET 2024

CHEMISTRY

Sample Paper 1



BASED ON LATEST PATTERN

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CUET PRATICE PAPER

01

1. By subjecting a colloid to high-speed rotation, what is the term used to describe the phenomenon where the colloid settles while impurities remain in the solution?

(a) Ultrafiltration
(b) Dialysis
(c) Ultra-centrifugation
(d) Mechanical dispersion

2. Regarding the Hall-eroult process for aluminum extraction, which of the following statements is incorrect?

(a) The process generates CO and CO_2

(b) The mixture of Al_2O_3 and CaF_2 reduces the melting point and enhances conductivity

(c) Reduction of Al^{3+} occurs at the cathode to produce aluminum

(d) Na3AlF6 acts as the electrolyte

3. If Ef and Eb represent the activation energies of the forward and reverse reactions, and the reaction is known to be exothermic, then which of the following statements is correct?

(a) $E_f < E_b$
(b) $E_f > E_b$
(c) $E_f = E_b$
(d) Data insufficient to predict

4. Which of the following compounds will produce a white precipitate when reacting with AgNO3?

(a) $K_2[Pt(en)_2Cl_2]$
(b) $[CO(NH_3)_3Cl_3]$
(c) $[Cr(H_2O)_6]Cl_3$
(d) $[Fe(H_2O)_3Cl_3]$

5. Among the elements B, C, N, and O, which element possesses the highest first ionization potential?

(a) Boron (b) Carbon (c) Nitrogen (d) Oxygen

6. When considering the noble gases, what is the general trend in melting points and boiling points as you move down the group?

(a) Decreases from He to Rn

(b) Increases from He to Ar and decreases from Ar to Rn

(c) Decreases from He to Ar and then increases from Ar to Rn

(d) Increases from He to Rn

7. When the temperature of a reacting system is increased by 10°C, the rate of reaction almost doubles. What is the most appropriate reason for this phenomenon?

(a) Activation energy decreases with an increase in temperature

(b) The fraction of molecules with the threshold energy increases

(c) Collision frequency increases

(d) The value of the threshold energy decreases

8. Match the terms in List I with their corresponding definitions in List II:

List I	**List II**
A. Binary solution	I. A solution that contains the maximum amount of solute that can be dissolved in a given amount of solvent at a given temperature.
B. Isotonic solutions	II. Solutions having the same osmotic pressure at a given temperature.
C. Hypotonic solution	III. A solution with two components.
D. Saturated solution	IV. A solution whose osmotic pressure is less than that of the reference solution.

(a) A-IV, B-II, C-I, D-III (b) A-II, B-IV, C-I, D-III

(c) A-IV, B-II, C-III, D-I (d) A-I, B-II, C-IV, D-III

9. What makes fluorine the most reactive element among the group 17 elements?

(a) Its electronegativity and small size of the atom

(b) Its large size of the atom

(c) Its extremely low oxidizing power and high dissociation energy of F-F bond

(d) Its high ionization energy

10. Provide the electronic configuration of copper:

(a) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9 4s^2$ (b) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$

(c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^4 4s^2$ (d) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$

11. Identify the compound among the following that, when exposed to lower levels in the air, can lead to slightly impaired hearing and vision:

(a) Chloromethane (b) Methylene chloride

(c) Chloroform (d) Carbon tetrachloride

12. When propanamide reacts with bromine in an aqueous solution of sodium hydroxide, what compound is produced?

(a) Ethan amine (b) Propanamine (c) Butanamide (d) Butanamide

13. What is the term for certain organic compounds that are required in small amounts in our diet, and their deficiency can lead to diseases?

(a) Proteins (b) Amino acids (c) Carbohydrates (d) Vitamins

14. Antidepressant drugs are known for inhibiting enzymes responsible for the degradation of which chemical compound?

(a) Noradrenaline (b) Histamine

(c) Hydrochloric acid (d) Chlordiazepoxide

15. To which class of compounds do enzymes belong?

(a) Polysaccharides
(b) Polypeptides
(c) Poly- nitrogen heterocyclic compounds
(d) Hydrocarbons

16. Among the following polymers, which one is classified as a condensation polymer?

(a) Dacron
(b) PVC
(c) Polystyrene
(d) Teflon

17. Arrange the three electrolytes (A, B, C) in ascending order of their limiting molar conductivity:

A. (PX_3)
B. (PX_2)
C. (PX_4)

(a) B < C < A
(b) A < B < C
(c) B < A < C
(d) A < C < B

18. Among the following colligative properties, which is the most suitable for determining the molecular weight of proteins and polymers?

(a) Reduction in vapor pressure
(b) Osmotic pressure of the solution
(c) Increase in boiling point
(d) Reduction in freezing point

19. Identify the property below that is NOT considered a colligative property.

(a) Decrease in freezing point
(b) Osmotic pressure of the solution
(c) Decrease in vapor pressure
(d) Increase in boiling point

20. In comparison to a 1 M sugar solution, the elevation of boiling point in a 1 M KCl solution is approximately:

(a) Double
(b) Triple
(c) The same
(d) None of the above

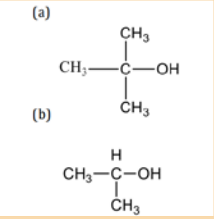
21. Between a 0.1 molal aqueous solution of glucose and a 0.1 molal aqueous solution of KCl, which one will have a higher boiling point?

(a) 0.1 molal aqueous solution of glucose
(b) 0.1 molal aqueous solution of KCl
(c) Both will have the same boiling point
(d) It will depend on atmospheric moisture

Read the passage given below and answer the questions (22-26)

Alcohols and phenols exhibit acidic properties. The acidity of phenol is influenced by the presence of electron-withdrawing groups, which enhance its acidity, while electron-donating groups decrease it. Alcohols can undergo nucleophilic substitution reactions when treated with hydrogen halides, resulting in the formation of alkyl halides. When primary alcohols are oxidized, they can yield aldehydes when mild oxidizing agents are used, or carboxylic acids when strong oxidizing agents are employed. Secondary alcohols, on the other hand, tend to yield ketones upon oxidation. The presence of the hydroxyl (-OH) groups in phenols activates the aromatic ring, making it more susceptible to electrophilic substitution reactions. Phenol can serve as a precursor to various important compounds, including salicylaldehyde, salicylic acid, picric acid, and others.

22. Among the given alcohols, which one is known to be resistant to oxidation?



(c) $CH_3—CH_2—OH$

(d) $CH_3—OH$

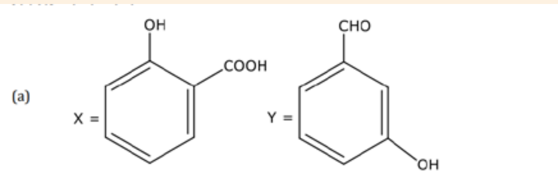
23. Which of the following groups enhances the acidic character of phenol?

(a) CH_3O^- (b) CH_3^- (c) NO_2^- (d) All of the above

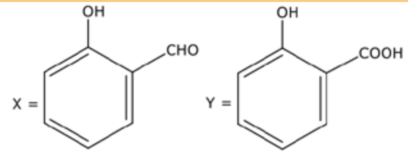
24. When considering the reaction shown below:

$CH_3CH_2OH + H_2SO_4\,(443K) \rightarrow X + Y$

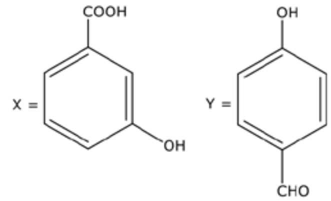
What are the products X and Y?



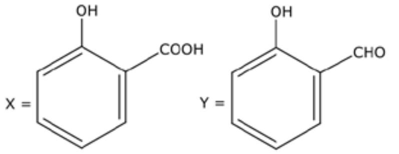
(b)



(c)



(d)



25. What is the expected product of the reaction when CrO_3 is used in the presence of $CH_3CH_2CH_2OH$?

(a) CH_3CH_2COOH (b) CH_3CHO (c) CH_2CH_2 (d) CH_3COOH

26. Predict the product of the reaction when C_2H_5OH is subjected to H_2SO_4 at 443K.

(a) $CH_2{=}CH_2$ (b) CH_3-CH_3 (c) CH_3CHO (d) CH_3COOH

27. What is the general trend in the melting and boiling points of noble gases as you move down the group?

(a) Chromium sulphate (b) Chromyl chloride (c) Ferrochrome (d) Chromate

28. What occurs when $K_2Cr_2O_7$ is reacted with KI?

(a) Chromate is produced (b) Chromyl chloride is formed

(c) Acetic acid is generated (d) I_2 is liberated from KI

29. The concept that metals possess two types of valency, primary (ionizable) and secondary (non-ionizable), is attributed to which scientist or postulate?

(a) Rutherford (b) Werner (c) Pauling (d) Mendeleev

30. Consider the statements below:

Statement I: Ortho- and para-nitrophenols can be separated by steam distillation.

Statement II: The ortho isomer forms intermolecular hydrogen bonds, while the para isomer forms intramolecular hydrogen bonds.

In light of these statements, choose the most appropriate answer:

(a) Both Statement I and Statement II are correct.

(b) Both Statement I and Statement II are incorrect.

(c) Statement I is correct and Statement II is incorrect.

(d) Statement I is incorrect and Statement II is correct.

31. Consider the statements below:

Statement I: A 0.1 M solution of KCl has a higher osmotic pressure than a 0.1 M solution of glucose at the same temperature.

Statement II: In solution, KCl dissociates to produce a greater number of particles.

In light of these statements, choose the most appropriate answer:

(a) Both Statement I and Statement II are correct.

(b) Both Statement I and Statement II are incorrect.

(c) Statement I is correct and Statement II is incorrect.

(d) Statement I is incorrect and Statement II is correct.

32. Consider the statements below:

Statement I: The conductivity of an electrolyte increases as its concentration decreases.

Statement II: The number of ions per unit volume decreases upon dilution.

In light of these statements, choose the most appropriate answer:

(a) Both Statement I and Statement II are correct.

(b) Both Statement I and Statement II are incorrect.

(c) Statement I is correct and Statement II is incorrect.

(d) Statement I is incorrect and Statement II is correct.

33. Consider the statements below:

Statement I: Oxidation of ketones is easier compared to aldehydes.

Statement II: The C–C bond in ketones is stronger than the C–H bond in aldehydes.

In light of these statements, choose the most appropriate answer:

(a) Both Statement I and Statement II are correct.

(b) Both Statement I and Statement II are incorrect.

(c) Statement I is correct and Statement II is incorrect.

(d) Statement I is incorrect and Statement II is correct.

34. Kohlrausch proposed the following relation for strong electrolytes:

$\wedge = \wedge_0 - A\sqrt{C}$

Which of the following equalities holds true?

(a) $\wedge = \wedge_0$ as C approaches $\sqrt{A}$

(b) $\wedge = \wedge_0$ as C approaches ∞

(c) $\wedge = \wedge_0$ as C approaches 0

(d) $\wedge = \wedge_0$ as C approaches 1

35. What is the simplest method to determine if a system is a colloid?

(a) Tyndall effect

(b) Brownian movement

(c) Electrodialysis

(d) Determining particle size

36. What is the product obtained when methyl iodide reacts with sodium ethoxide?

(a) Methyl acetate

(b) Ethyl acetate

(c) Acetone

(d) Methyl ethyl ether

37. In a complex MA3X3, when unidentate ligands A and X are present, what is a possible outcome?

(a) Two geometrical isomers

(b) Three geometrical isomers

(c) Two geometrical isomers that can be resolved into a pair of enantiomers

(d) Two geometrical isomers, one of which can be resolved into a pair of enantiomers

38. What is the formula used to calculate the packing efficiency of a face-cantered unit cell?

(a) Carbon monoxide

(b) Carbon dioxide

(c) Hydrogen sulphide

(d) Sulphur dioxide

39. When some of the constituent particles are missing from their lattice sites, what type of defect is observed?

(a) Interstitial Defect

(b) Vacancy Defect

(c) Substitutional Defect

(d) Metal Deficiency

40. Match the items in List I to those in List II:

List I	List II
A. Sulphur vapor passed	I. Normal electrolyte solution through cold water
B. Soap mixed with colloids	II. Molecular water above critical micelle concentration
C. White of egg whipped colloid	III. Associated with water
D. Soap mixed with molecular colloids	IV. Macro- water below critical micelle concentration

(a) A-II, B-III, C-IV, D-I

(b) A-II, B-IV, C-I, D-III

(c) A-IV, B-II, C-III, D-I

(d) A-I, B-II, C-IV, D-III

41. What is the term for the reduction of alkanenitriles using sodium and alcohol or LiAlH4?

(a) Rosenmund reduction
(b) Catalytic reduction
(c) Wolf-Kishner reduction
(d) Mendius reaction

42. When ethylene glycol and terephthalic acid undergo condensation polymerization, what is the resulting product?

(a) Buna-S
(b) Terylene
(c) Glyptal
(d) PVC

43. Among the following options, which compound is considered the strongest acid?

(a) $BrCH_2COOH$
(b) FCH_2COOH
(c) ICH_2COOH
(d) $ClCH_2COOH$

44. What category does nylon belong to?

(a) Vinyl polymer
(b) Polyester
(c) Polyamide
(d) Polysaccharide

45. When polypeptide chains run in parallel and are held together by hydrogen and disulfide bonds, what type of protein is formed?

(a) Fibrous protein
(b) Globular protein
(c) Spherical protein
(d) Linear protein

46. Sodium salts of sulphonated long-chain alcohols or hydrocarbons are examples of which type of compound?

(a) Non-ionic detergent
(b) Cationic detergent
(c) Anionic detergent
(d) Soap

47. Among the following compounds, which one is the most basic?

(a) $C_6H_5NH_2$
(b) $(C_6H_5)_2NH$
(c) CH_3NH_2
(d) $(CH_3)_2NH$

48. When propanamide reacts with bromine in an aqueous solution of sodium hydroxide, what compound is produced?

(a) Ethanamine (b) Propanamine (c) Butanamie (d) Butanamide

49. What is the term for certain organic compounds that are required in small amounts in our diet but their deficiency can lead to diseases?

(a) Proteins (b) Amino acids (c) Carbohydrates (d) Vitamins

50. What do antidepressant drugs do in the context of inhibiting enzyme activity?

(a) They inhibit the degradation of noradrenaline.

(b) They inhibit the degradation of histamine.

(c) They inhibit the degradation of hydrochloric acid.

(d) They inhibit the degradation of chlordiazepoxide.

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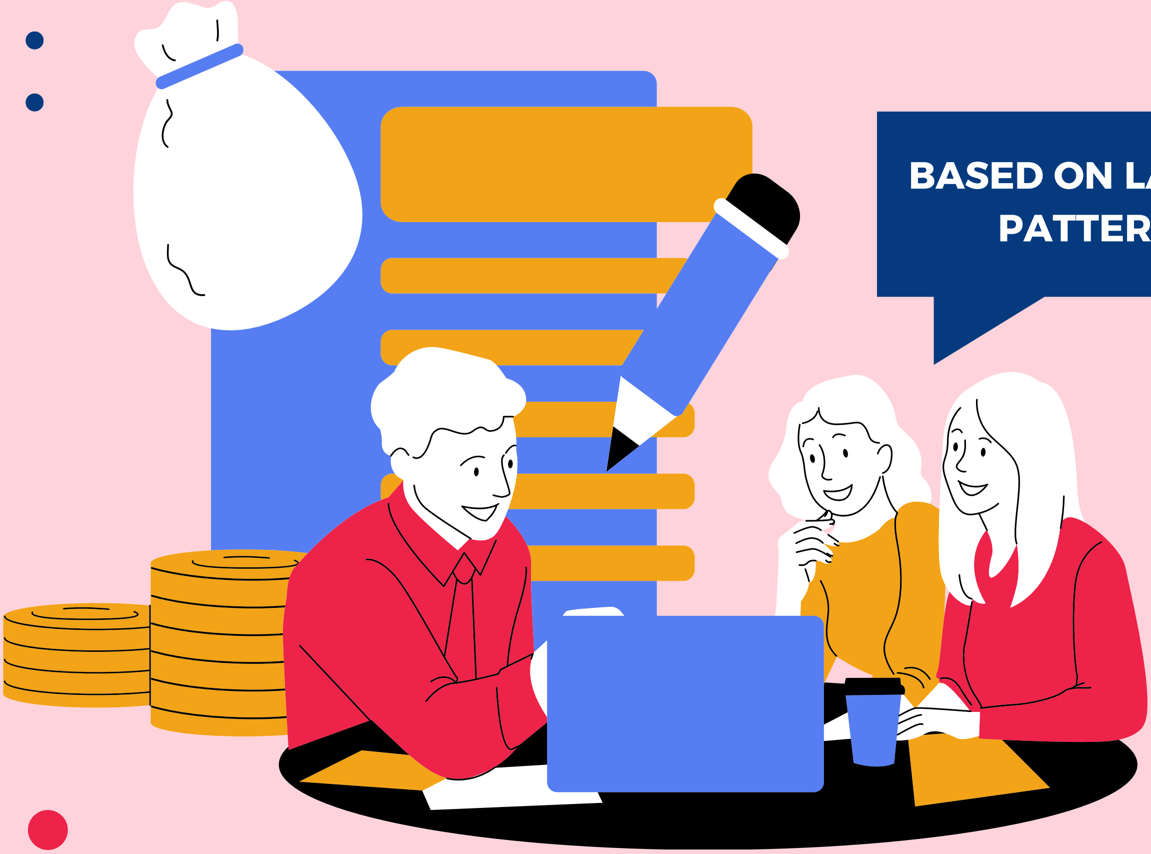
Sample Paper Solution 1



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HINTS AND SOLUTIONS

1. Answer: (c) Ultra-centrifugation

Explanation: The term used to describe the phenomenon where a colloid settles while impurities remain in the solution due to high-speed rotation is "Ultra-centrifugation." Ultra-centrifugation is a technique that uses a high-speed centrifuge to separate particles in a solution based on their size, shape, and density.

2. Answer: (a) The process generates CO and CO_2

Explanation: The Hall-Heroult process for aluminium extraction involves the reduction of aluminium oxide (Al_2O_3) using a mixture of cryolite (Na_3AlF_6) and calcium fluoride (CaF_2) as the electrolyte. During this process, carbon electrodes are used, and they react with oxygen to produce carbon monoxide (CO) and carbon dioxide (CO_2) gas. So, the statement that the process generates CO and CO_2 is correct.

3. Answer: (b) $E_f > E_b$

Explanation: For an exothermic reaction, the activation energy for the forward reaction (Ef) is greater than the activation energy for the reverse reaction (Eb). This is because the forward reaction releases energy (exothermic), so it requires less energy to activate.

4. Answer: (b) $[CO(NH_3)_3Cl_3]$

Explanation: The compound $[CO(NH_3)_3Cl_3]$ is a complex of cobalt (III) ammine chloride. When it reacts with silver nitrate (AgNO3), it forms a white precipitate of silver chloride (AgCl). Therefore, the correct choice is (b).

5. Answer: (d) Oxygen

Explanation: Among the elements B, C, N, and O, oxygen (O) possesses the highest first ionization potential. Ionization potential increases across a period from left to right in the periodic table, so oxygen has a higher ionization potential than boron, carbon, and nitrogen.

6. Answer: (d) Increases from He to Rn

Explanation: The general trend in melting points and boiling points of noble gases as you move down the group is that they increase from helium (He) to radon (Rn). This is because as you move down the group, the atomic size and the London dispersion forces (Van der Waals forces) increase, leading to higher melting and boiling points.

7. Answer: (b) The fraction of molecules with the threshold energy increases

Explanation: When the temperature of a reacting system is increased, the kinetic energy of the molecules increases, and more molecules have the energy required to overcome the activation energy barrier. This increases the fraction of molecules with the threshold energy, leading to a higher rate of reaction. So, choice (b) is the most appropriate reason for this phenomenon.

8. Answer: (a) A-IV, B-II, C-I, D-III

Explanation:

- A binary solution contains two components (A-IV).
- Isotonic solutions have the same osmotic pressure (B-II).
- Hypotonic solution refers to a solution with lower osmotic pressure (C-I).
- A saturated solution contains the maximum amount of solute that can be dissolved (D-III).

9. Answer: (a) Its electronegativity and small size of the atom

Explanation: Fluorine is the most reactive element among the group 17 (halogens) elements due to its high electronegativity and small atomic size. These factors make it highly effective at attracting electrons and forming strong covalent bonds, leading to its reactivity.

10. Answer: (c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^4 4s^2$

Explanation: The electronic configuration of copper (Cu) is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^4 4s^2$. Copper has 29 electrons, and this configuration reflects its electron distribution in its atomic orbitals.

11. Answer: (c) Chloroform

Explanation: Chloroform ($CHCl_3$) exposure to lower levels in the air can lead to slightly impaired hearing and vision. Prolonged or high-level exposure to chloroform can cause more severe health issues.

12. Answer: (b) Propanamine

Explanation: When propanamide reacts with bromine in an aqueous solution of sodium hydroxide, the compound produced is propanamine.

13. Answer: (d) Vitamins

Explanation: Vitamins are organic compounds that are required in small amounts in our diet. Their deficiency can lead to various diseases. Vitamins are essential for various metabolic processes and the proper functioning of the body.

14. Answer: (a) Noradrenaline

Explanation: Antidepressant drugs inhibit enzymes responsible for the degradation of noradrenaline (also known as norepinephrine). This leads to increased levels of noradrenaline in the synaptic clefts, which can help alleviate symptoms of depression.

15. Answer: (b) Polypeptides

Explanation: Enzymes belong to the class of compounds known as polypeptides. They are biological catalysts made up of amino acid chains.

16. Answer: (a) Dacron

Explanation: Dacron is a condensation polymer. It is formed through a condensation reaction, where water is eliminated as a byproduct during the polymerization process.

17. Answer: (c) $B < A < C$

Explanation: The order of limiting molar conductivity is: $B < A < C$. This means that ($PX2$) has the lowest, followed by ($PX3$), and ($PX4$) has the highest molar conductivity among the given electrolytes.

18. Answer: (b) Osmotic pressure of the solution

Explanation: Osmotic pressure of a solution is the most suitable colligative property for determining the molecular weight of proteins and polymers. This is because it is directly related to the number of solute particles present in the solution.

19. Answer: (c) Decrease in vapor pressure

Explanation: Decrease in vapor pressure is NOT considered a colligative property. Colligative properties depend on the number of solute particles, but vapor pressure reduction is not one of them.

20. Answer: (c) The same

Explanation: Both a 1 M sugar solution and a 1 M KCl solution will have the same elevation in boiling point. This is because the elevation in boiling point depends on the number of solute particles, regardless of the nature of the solute.

21. Answer: (b) 0.1 molal aqueous solution of KCl

Explanation: The boiling point elevation is directly proportional to the number of solute particles in the solution. KCl dissociates into two ions (K^+ and Cl^-) in water, while glucose does not dissociate. Therefore, a 0.1 molal aqueous solution of KCl will have a higher boiling point compared to a 0.1 molal aqueous solution of glucose.

22. Answer: (a) CH_3—CH_2—OH

Explanation: Among the given alcohols, CH_3—CH_2—OH (Ethanol) is known to be resistant to oxidation.

23. Answer: (c) NO^{2-}

Explanation: The NO^{2-} group (nitro group) enhances the acidic character of phenol.

24. Answer: X: C_2H_5Cl (Ethyl Chloride), Y: H_2O (Water)

Explanation: The reaction of CH_3CH_2OH with H_2SO_4 at 443K results in the formation of ethyl chloride (C_2H_5Cl) and water (H_2O).

25. Answer: (a) CH_3CH_2COOH

Explanation: When CrO_3 is used in the presence of $CH_3CH_2CH_2OH$ (1-propanol), the expected product is CH3CH2COOH (Propanoic acid).

26. Answer: (c) CH_3CHO

Explanation: When C_2H_5OH (Ethanol) is subjected to H_2SO_4 at 443K, it undergoes dehydration to form CH_3CHO (Acetaldehyde).

27. Answer: (a) Chromium sulphate

Explanation: This question seems to be incomplete. The options provided are related to different chromium compounds, and none of them relate to the melting and boiling points of noble gases.

28. Answer: (d) I_2 is liberated from KI

Explanation: When $K_2Cr_2O_7$ is reacted with KI, I_2 is liberated.

29. Answer: (b) Werner

Explanation: The concept that metals possess two types of valency, primary (ionizable) and secondary (non-ionizable), is attributed to Alfred Werner.

30. Answer: (a) Both Statement I and Statement II are correct.

Explanation: Statement I is correct. Ortho- and para-nitrophenols can be separated by steam distillation. Statement II is also correct. The ortho isomer forms intermolecular hydrogen bonds, while the para isomer forms intramolecular hydrogen bonds.

31. Answer: (a) Both Statement I and Statement II are correct.

Explanation: Statement I is correct because a 0.1 M solution of KCl has a higher osmotic pressure than a 0.1 M solution of glucose at the same temperature due to the greater number of particles produced by KCl dissociation. Statement II is also correct as KCl dissociates into two ions (K^+ and Cl^-) in solution.

32. Answer: (c) Statement I is correct and Statement II is incorrect.

Explanation: Statement I is correct because the conductivity of an electrolyte increases as its concentration increases, not decreases. Statement II is incorrect because the number of ions per unit volume actually increases upon dilution.

33. Answer: (c) Statement I is correct and Statement II is incorrect.

Explanation: Statement I is correct. Oxidation of ketones is easier compared to aldehydes. Statement II is incorrect. The C–H bond in aldehydes is stronger than the C–C bond in ketones.

34. Answer: (b) $\wedge = \wedge_0$ as C approaches ∞

Explanation: As the concentration (C) of the solution approaches infinity, the molar conductivity ($\wedge$) of a strong electrolyte approaches its limiting molar conductivity ($\wedge_0$) according to Kohlrausch's law.

35. Answer: (a) Tyndall effect

Explanation: The simplest method to determine if a system is a colloid is by observing the Tyndall effect, where colloidal particles scatter light when a beam of light is passed through the colloidal dispersion.

36. Answer: (b) Ethyl acetate

Explanation: When methyl iodide reacts with sodium ethoxide, ethyl acetate is obtained.

37. Answer: (b) Three geometrical isomers

Explanation: In a complex MA_3X_3 with unidentate ligands A and X, three geometrical isomers are possible.

38. Answer: (b) Carbon dioxide

Explanation: The formula used to calculate the packing efficiency of a face-centered unit cell involves dividing the volume of atoms in the unit cell by the volume of the unit cell, which is similar to the way the volume of atoms in a molecule is calculated for gases like carbon dioxide.

39. Answer: (b) Vacancy Defect

Explanation: When some of the constituent particles are missing from their lattice sites, it is known as a vacancy defect.

40. Answer: (a) A-II, B-III, C-IV, D-I

Explanation:

- A. Sulphur vapor passed through cold water → II. Molecular water above critical micelle concentration
- B. Soap mixed with colloids → III. Associated with water
- C. White of egg whipped colloid → IV. Macro-water below critical micelle concentration
- D. Soap mixed with molecular colloids → I. Normal electrolyte solution

41. Answer: (c) Wolf-Kishner reduction

Explanation: The reduction of alkanenitriles using sodium and alcohol or LiAlH4 is known as the Wolf-Kishner reduction. This reaction converts alkanenitriles into alkanes by reducing the nitrile group to a primary amine.

42. Answer: (b) Terylene

Explanation: When ethylene glycol and terephthalic acid undergo condensation polymerization, the resulting product is Terylene, which is a type of polyester.

43. Answer: (b) FCH_2COOH

Explanation: Among the options provided, FCH_2COOH (Fluoroacetic acid) is considered the strongest acid due to the high electronegativity of fluorine, which stabilizes the negative charge on the carboxylate ion.

44. Answer: (c) Polyamide

Explanation: Nylon belongs to the category of polyamides. It is a type of synthetic polymer formed through the condensation polymerization of amine and acid monomers.

45. Answer: (a) Fibrous protein

Explanation: When polypeptide chains run in parallel and are held together by hydrogen and disulfide bonds, a fibrous protein is formed. Examples include keratin, collagen, and elastin.

46. Answer: (c) Anionic detergent

Explanation: Sodium salts of sulphonated long-chain alcohols or hydrocarbons are examples of anionic detergents. They have a negatively charged hydrophilic head.

47. Answer: (d) $(CH_3)_2NH$

Explanation: Among the options provided, $(CH_3)_2NH$ (Dimethylamine) is the most basic compound. It has a higher electron density on the nitrogen atom compared to the other options.

48. Answer: (b) Propanamine

Explanation: When propanamide reacts with bromine in an aqueous solution of sodium hydroxide, the compound produced is propanamine.

49. Answer: (d) Vitamins

Explanation: Vitamins are organic compounds that are required in small amounts in our diet. Their deficiency can lead to various diseases. Vitamins are essential for various metabolic processes and the proper functioning of the body.

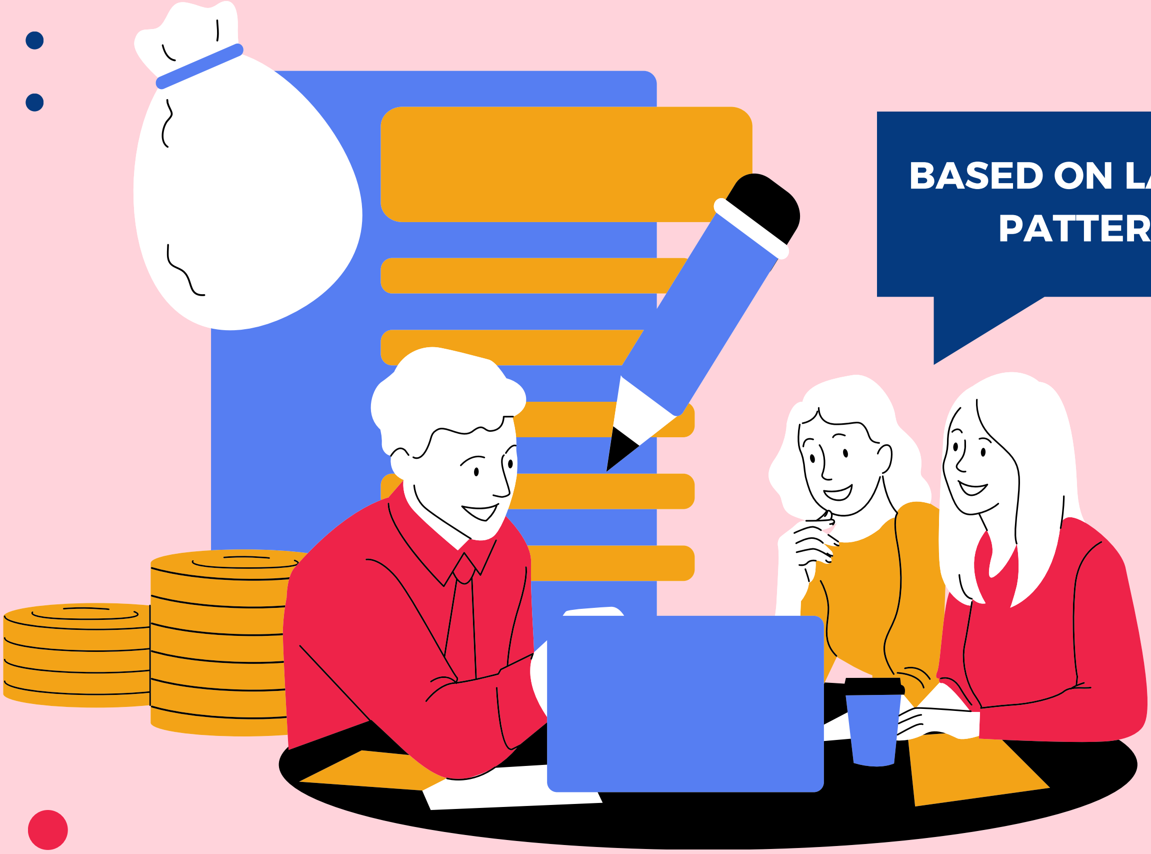
50. Answer: (a) They inhibit the degradation of noradrenaline.

Explanation: Antidepressant drugs inhibit the degradation of noradrenaline, which helps to increase its levels in the synaptic clefts and alleviate symptoms of depression.

CUET 2024

CHEMISTRY

Sample Paper 2



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02

Q1. In an alloy composed of copper, silver, and gold, where copper forms a ccp lattice, silver atoms occupy the edge centers, and gold is located at the body center. What is the chemical formula of this alloy?

a) Cu_4Ag_2Au
b) Cu_4Ag_4Au
c) Cu_4Ag_3Au
d) CuAgAu

Q2. Copper has a face-centered cubic (fcc) crystal structure with a unit cell length of 361 pm. What is the radius of a copper atom?

a) 157 pm
b) 181 pm
c) 127 pm
d) 108 pm

Q3. Why do alkali halides not exhibit Frenkel defects?

a) Cations and anions have almost equal size.

b) There is a large difference in size between cations and anions.

c) Cations and anions have a low coordination number.

d) Anions cannot be accommodated in voids.

Q4. A solution containing urea (molecular mass: 56 g mol-1) boils at 100.18°C under atmospheric pressure. Given that the cryoscopic constant (Kf) and ebullioscopic constant (Kb) for water are 1.86 and 0.512 K kg mol-1, respectively, at what temperature will the solution freeze?

a) -0.654°C
b) 0.654°C
c) -6.54°C
d) 6.54°C

Q5. Why does the solubility of a gas in a liquid decrease with an increase in temperature?

a) Dissolution of a gas in a liquid is an endothermic process.

b) Dissolution of a gas in a liquid is an exothermic process.

c) Gases are highly compressible.

d) All of the above.

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Q6. **Assertion:** The process of solubility of any gas in any liquid is exothermic.

Reason: All gases are highly soluble in any liquid.\

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Q7. Considering the standard electrode potentials of the following half-cells, arrange the metals in ascending order of reducing power:

(a) Ag < Cr < Mg < K

(b) Cr < Ag < Mg < K

(c) Mg < K < Cr < Ag

(d) K < Mg < Cr < Ag

Q8. Determine the quantity of charge needed to convert 1 mole of MnO^{4-} to Mn^{2+}.

(a) $1.8 \times 10^5 C$

(b) $3.2 \times 10^6 C$

(c) $4.1 \times 10^4 C$

(d) $4.8 \times 10^5 C$

Q9. What is the pressure of H2 required to neutralize the potential of an H2-electrode in pure water at 298 K?

(a) 10-14 atm

(b) 10-12 atm

(c) 10-10 atm

(d) 10-4 atm

Q10. Which type of reaction maintains the same unit of rate and rate constant?

(a) second order reaction

(b) third order reaction

(c) first order reaction

(d) zero order reaction

Q11. If the volume of the vessel containing the reaction $2NO + O_2 \rightarrow 2NO_2$ is reduced to one-third of its original volume, how many times will the reaction rate increase?

(a) 3 times

(b) 6 times

(c) 27 times

(d) 30 times

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Q12. When alkaline $KMnO_4$ is exposed to KI, what does the iodide ion get oxidized to?

(a) IO^{3-} (b) I_2 (c) IO^{-} (d) IO^{4-}

Q13. Find the spin-only magnetic moment value for Cr^{3+} ion.

(a) 3.57 B.M (b) 3.47 B.M (c) 2.87 B.M (d) 3.87 B.M

Q14. Sort the following compounds based on their increasing magnetic moments:

$[Fe(CN)_6]^{4-}$, $[Fe(CN)_6]^{3-}$, $[Cr(NH_3)_6]^{3+}$, $[Ni(H_2O)_4]^{2+}$.

(a) (i) < (iii) < (ii) < (iv) (b) (i) < (ii) < (iv) < (iii)

(c) (ii) < (i) < (iv) < (iii) (d) (iii) < (ii) < (i) < (iv)

Q15. Zone refining relies on the concept that:

(a) impurities are more soluble in molten metal than in solid metal.

(b) vapors of volatile compounds can be decomposed into pure metal.

(c) different components of a mixture are adsorbed differently on an adsorbent.

(d) impurities of low-boiling metals can be separated by distillation.

Q16. Which of the following statements is accurate?

(a) Nickel is purified through zone refining.

(b) Cast iron is obtained by remelting pig iron with scrap and coke using hot air blast.

(c) In the extraction of silver, silver is extracted as a cationic complex.

(d) Zr and Ti are purified using the van Arkel method.

Q17. Why is the use of aspartame limited to cold foods and drinks?

(a) It reacts with the food at cooking temperature.

(b) It is unstable to heat and decomposes at cooking temperature.

(c) It is 500 times sweeter than cane sugar.

(d) It becomes bitter at cooking temperature.

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Q18. Match the substances in Column I with their correct uses in Column II.

Column I	Column II
Sodium perborate	Antiseptic
Chlorine	Soap
Bithional	Disinfectant
Potassium stearate	Milk bleaching agent

(a) A - (ii), B - (iii), C - (iv), D - (i)
(b) A - (i), B - (iii), C - (iv), D - (ii)
(c) A - (iv), B - (i), C - (ii), D - (iii)
(d) A - (iii), B - (iv), C - (i), D - (ii)

Q19. Connect the substances in Column I with their corresponding uses in Column II.

Column I	Column II
$CH_3(CH_2)_{10}CH_2OSO^{3-}Na^+$	Cationic detergents
$[CH_3(CH_2)_{15}N(CH_3)^{2-}CH_3]^+Br^-$	Non-ionic detergent
$CH_3(CH_2)_{16}COO(CH_2CH_2O)\ nCH_2CH_2OH$	Soap
$C_{17}H_{35}COONa$	Anionic detergent

(a) A - (iii), B - (ii), C - (iv), D - (i)
(b) A - (ii), B - (iv), C - (i), D - (iii)
(c) A - (i), B - (iii), C - (iv), D - (ii)
(d) A - (iv), B - (i), C - (ii), D - (iii)

Q20. Among the options, which one is NOT a condensation polymer?

(a) Nylon-6, 6
(b) Nylon-6
(c) Dacron
(d) Buna-S

Q21. Identify the synthetic polymer that closely resembles natural rubber.

(a) Neoprene
(b) Chloroprene
(c) Glyptal
(d) Nylon

Q22. Which of the following sets exclusively consists of addition homopolymers?

(a) Polythene, natural rubber, cellulose
(b) Nylon, polyester, melamine resin
(c) Teflon, Bakelite, orlon
(d) Neoprene, PVC, polythene

Q23. The secondary structure of proteins is represented by:

(a) Alpha-helix structure
(b) Beta-pleated structure
(c) Both (a) and (b)
(d) None of the above

Q24. Uridine, present in RNA, is a:

(a) Nucleotide (b) Pyrimidine (c) Purine (d) Nucleoside

Q25. How many molecules of phenyl hydrazine react with glucose to produce glucosazone?

(a) 3 (b) 4 (c) 2 (d) 1

Q26. Which of the following is the correct formulation of the entity according to IUPAC?

(a) $[Co\ (CN)_6]^{3-}$ (b) $[Co\ (CN)_4]^{3-}$ (c) $[Co\ (CN)]^{3-}$ (d) $[Co\ (CN)_6]$

Q27. What is the appropriate naming for K3[Fe (CN)6]?

(a) Tripotassium hexacyanidoferrate(III)

(b) Potassium hexacyanoferrate(III)

(c) Tripotassium hexacyanoferrate(III)

(d) Potassium hexacyanidoferrate(III)

Q28. Pick out the correct statement with respect to [Mn (CN)63-]

(a) It is sp^2d^2 hybridized, tetrahedral

(b) It is d^2sp^3 hybridized, octahedral

(c) It is dsp^2 hybridized, square planar

(d) It is sp^3d^2 hybridized, octahedral

Q29. Secondary amines could be prepared by:

(a) Reduction of nitriles

(b) Hofmann bromamide reduction

(c) Reduction of amides

(d) Reduction of isonitriles

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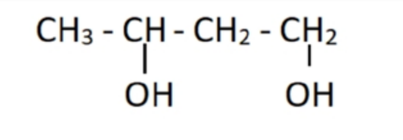
Q30. Identify the correct IUPAC name for the given compound.



$$CH_3 - \underset{OH}{\underset{|}{CH}} - CH_2 - \underset{OH}{\underset{|}{CH_2}}$$

(a) Butane-1,4-diol	(b) Butane-diol
(c) Butylene glycol	(d) Butane-1,3-diol

Q31. Hydrocarbons are formed when aldehydes and ketones react with KOH and ethylene glycol. This reaction is known as:

(a) Wolff-Kishner reduction.	(b) Clemmensen reduction
(c) Rosamund reduction	(d) Cannizzaro reaction

Q32. Which of the following will not give an aldol condensation?

(a) Phenyl acetaldehyde	(b) 2-Methylpentanal
(c) Benzaldehyde	(d) 1-Phenylpropanone

Q33. Arrange the following in the correct order of increasing acidic strength:

(a) Phenol < Ethanol < Chloroacetic acid < Acetic acid

(b) Ethanol < Phenol < Chloroacetic acid < Acetic acid

(c) Ethanol < Phenol < Acetic acid < Chloroacetic acid

(d) Chloroacetic acid < Acetic acid < Phenol < Ethanol

Q34. Aldehydes other than formaldehyde react with Grignard's reagent to give addition products which, upon hydrolysis, yield:

(a) Tertiary alcohols	(b) Secondary alcohols
(c) Primary alcohols	(d) Carboxylic acids

Q35. Which one is most reactive towards SN1 reaction?

(a) $C_6H_5CH(C_6H_5)Br$
(b) $C_6H_5CH(CH_3)Br$
(c) $C_6H_5C(CH_3)(C_6H_5)Br$
(d) $C_6H_5CH_2Br$

Q36. Which of the following is an example of nucleophilic substitution reaction?

(a) RX + KOH → ROH + KX
(b) 2RX + 2Na → R-R + 2NaX
(c) RX + H2 → R-H + HX
(d) RX + Mg → RMgX

Q37. The compound that responds to Tollen's test is:

(a) CH_3COCH_3
(b) CH_3CHO
(c) CH_3COOH
(d) $C_2H_5OC_2H_5$

Q38. When treated with alkali and iodine, which substance will not give the iodoform test?

(a) Acetone
(b) Ethanol
(c) Diethyl ketone
(d) Isopropyl alcohol

Q39. Toluene reacts with a halogen in the presence of iron (III) chloride, giving ortho and para halo compounds. The reaction is:

(a) Electrophilic elimination reaction
(b) Electrophilic substitution reaction
(c) Free radical addition reaction
(d) Nucleophilic substitution reaction

Q40. What is the test to differentiate between pentan-2-one and pentan-3-one?

(a)Iodoform test
(b)Benedict's test
(c)Fehling's test
(d)Aldol condensation

Read the passage given below and answer the following questions: (46-50)

Adsorption relies on the nature of the adsorbent. A rough solid surface possesses more pores and can adsorb a greater quantity of gases compared to a smooth surface. Commonly used adsorbents include silica gel and activated charcoal. The level of adsorption is also contingent on the surface area of the solid. The specific surface area of an adsorbent indicates the available surface for adsorption per gram of the adsorbent. A larger solid surface area equates to greater adsorption potential. Charcoal proves to be a more potent adsorbent than solid wood. Desorption, on the other hand, is the process of removing an adsorbed substance from a surface where it was absorbed.

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Physisorption is a non-specific process; it can accommodate any gas. However, easily liquefiable gases like NH_3, HCl, and CO_2 are adsorbed at a faster rate and to a larger extent than less easily liquefiable gases such as H_2, O_2, and N_2. This phenomenon depends on the critical temperature of the gas. The higher the critical temperature, the more readily the gas can be liquefied, leading to a higher rate of adsorption. In contrast, chemisorption is specific in nature. Therefore, only gases capable of forming chemical bonds with the adsorbent can undergo chemisorption.

Q46. Choose the correct statement regarding desorption.

(a) It is done by cooling or by increasing the applied pressure.

(b) It is done by heating or by reducing the applied pressure.

(c) It is done by heating or by increasing the applied pressure.

(d) It is done by cooling or by increasing the applied pressure.

Q47. Which statement regarding the physical adsorption of a gas on the surface of a solid is incorrect?

(a) With increasing temperature, adsorption continuously increases.

(b) Enthalpy changes are negative.

(c) It is non-specific in nature.

(d) It is reversible in nature.

Q48. At the same temperature and pressure, select the correct order of adsorption of the following gases on the same mass of charcoal.

(a) $SO_2 > CH_4 > H_2$ (b) $CH_4 > SO_2 > H_2$

(c) $H_2 > CH_4 > SO_2$ (d) $CH_4 > H_2 > SO_2$

Q49. When the adsorption of a gas on a solid metal surface is spontaneous and exothermic, what happens?

(a) ΔS increases. (b) ΔS decreases. (c) ΔG increases. (d) ΔH decreases.

Q50. Identify the incorrect statement from the following.

(a) Physical adsorption occurs at low temperatures, while chemisorption occurs at all temperatures.

(b) Physisorption has a low heat of adsorption, while chemisorption has a high one.

(c) Chemisorption is irreversible, and physisorption is reversible.

(d) The magnitude of chemisorption decreases with an increase in temperature, while physisorption increases with an increase in temperature.

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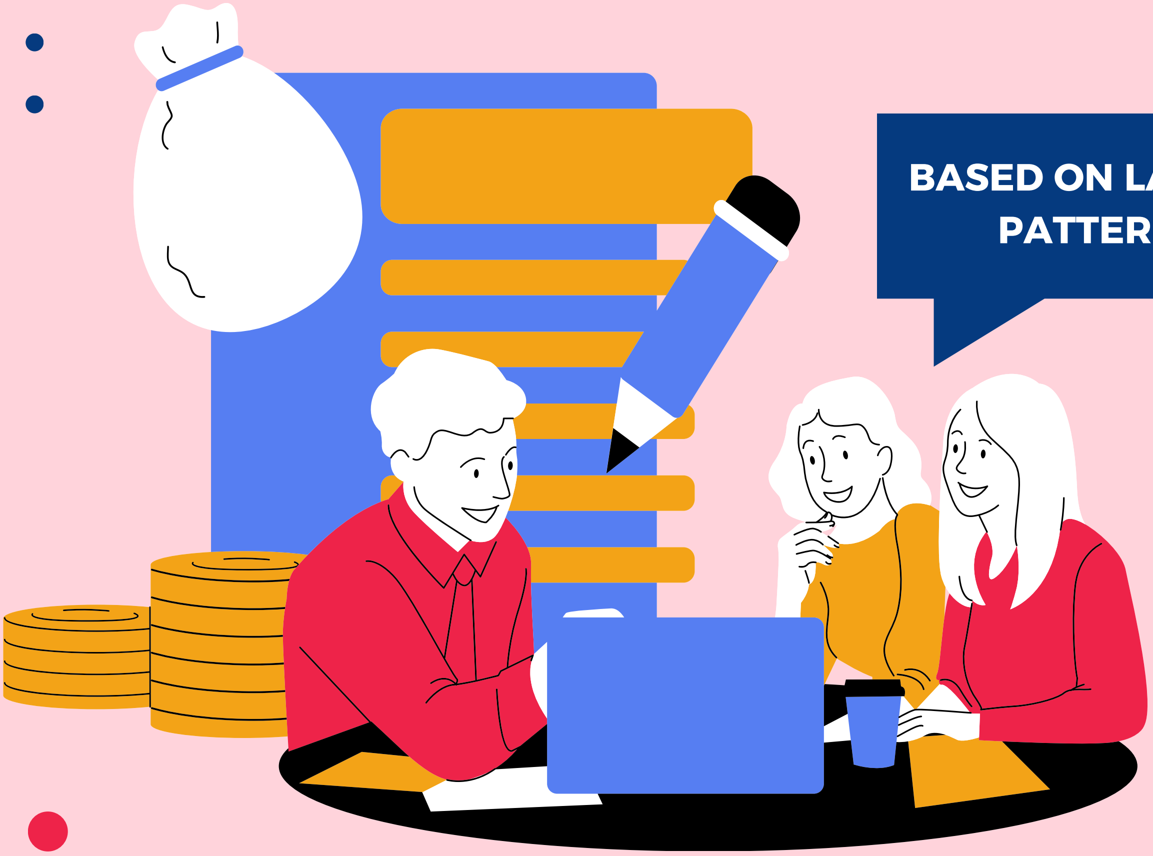

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03

Q.1. Which of the following statements is accurate regarding the digestion of glucose polymers by human beings?

(a) Polymers of α-glucose are readily digested, while those of β-glucose are not.

(b) Polymers of β-glucose are readily digested, while those of α-glucose are not.

(c) Both α- and β-glucose polymers are easily digested by human beings.

(d) Neither α- nor β-glucose polymers are readily digested by human beings.

Q.2. If a catalyst reduces the activation energy of the forward reaction by 10 kJ mol^{-1}, what effect does it have on the activation energy of the backward reaction?

(a) Increases by 10 kJ mol^{-1}

(b) Decreases by 10 kJ mol^{-1}

(c) Remains unaffected

(d) Cannot be predicted

Q.3. Which of the following sets of reaction conditions leads to the formation of the p-nitro derivative as the major product from aniline?

I. Acetyl chloride/pyridine followed by reaction with conc. H2SO4 + conc. HNO3.

II. Acetic anhydride/pyridine followed by conc. H2SO4 + conc. HNO3.

III. Dil. HCl followed by reaction with conc. H2SO4 + conc. HNO3.

IV. Reaction with conc. HNO3 + conc. H2SO4.

(a) Only I

(b) Both I & II

(c) Only III

(d) Both II & IV

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Q.4. For a 0.1 M solution, the colligative property will follow which order?

(a) NaCl > Na_2SO_4 > Na_3PO_4 (b) NaCl < Na_2SO_4 < Na_3PO_4

(c) NaCl > Na_2SO_4 ≈ Na_3PO_4 (d) NaCl < Na_2SO_4 = Na_3PO_4

Q.5. When MnO_2 is fused with KOH in the presence of air, a colored compound is formed. What is the product and its color?

(a) K_2MnO_4, dark green (b) $KMnO_4$ purple

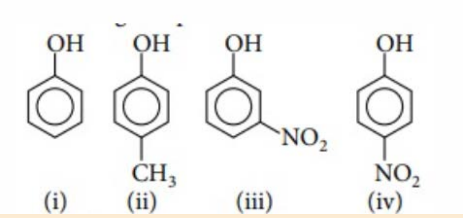
(c) Mn_2O_3, brown (d) Mn_3O_4, black.

Q.6. Which of the following processes is employed in the extractive metallurgy of magnesium?

(a) Fused salt electrolysis (b) Self reduction

(c) Aqueous solution electrolysis (d) Thermite reduction

Q.7. In the provided compounds:



What is the order of acidity?

(a) (iii) > (iv) > (i) > (ii) (b) (i) > (iv) > (iii) > (ii)

(c) (ii) > (i) > (iii) > (iv) (d) (iv) > (iii) > (i) > (ii)

Q 8. Which of the following elements is known for its allotropy in various forms such as diamond, graphite, and fullerenes?

(a) Carbon (b) Oxygen (c) Nitrogen (d) Silicon

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Q 9. What is the term for a chemical reaction in which two compounds exchange ions to form two new compounds?

(a) Precipitation reaction
(b) Displacement reaction
(c) Combination reaction
(d) Decomposition reaction

Q 10. Which gas is commonly known as laughing gas?

(a) Nitrous oxide (N_2O)
(b) Carbon dioxide (CO_2)
(c) Methane (CH_4)
(d) Sulphur hexafluoride (SF_6)

Q 11. What is the chemical formula for table salt?

(a) Na_2CO_3
(b) NaOH
(c) NaCl
(d) Na_2SO_4

Q12. What is the process by which plants convert sunlight into chemical energy?

(a) Photosynthesis
(b) Cellular respiration
(c) Fermentation
(d) Transpiration

Q 13. Which of the following is an example of a non-metal?

(a) Sodium (Na)
(b) Chlorine (Cl)
(c) Iron (Fe)
(d) Calcium (Ca)

Q 14. What is the chemical symbol for gold?

(a) Gd
(b) Go
(c) Au
(d) Ag

Q 15. What is the molecular formula for glucose?

(a) $C_6H_{12}O_6$
(b) CH_4O_2
(c) $C_{12}H_{24}O_{12}$
(d) $C_3H_6O_3$

Q 16. Which gas makes up the largest portion of the Earth's atmosphere by volume?

(a) Oxygen (O_2)
(b) Nitrogen (N_2)
(c) Carbon dioxide (CO_2)
(d) Argon (Ar)

Q 17. What is the chemical name for baking soda?

(a) Sodium chloride
(b) Sodium bicarbonate
(c) Sodium carbonate
(d) Sodium hydroxide

Q18. Which element has the highest atomic number on the periodic table?

(a) Uranium (U)
(b) Hydrogen (H)
(c) Oxygen (O)
(d) Einsteinium (Es)

Q19. What is the chemical formula for sulfuric acid?

(a) H_2SO_4
(b) H_2SO_3
(c) HCl
(d) Na_2SO_4

Q 20. Which gas is responsible for the green colour of plants?

(a) Oxygen (O_2)
(b) Carbon dioxide (CO_2)
(c) Chlorine (Cl)
(d) Chlorophyll

Q 21. What is the chemical formula for methane?

(a) CH_4
(b) C_2H_6
(c) CO_2
(d) H_2O

Q 22. What is the process by which a solid change directly into a gas without passing through the liquid state?

(a) Sublimation
(b) Condensation
(c) Vaporization
(d) Fusion

Q 23. What is the electronic configuration of the element with atomic number 74?

(a) [Kr] $5s^2\ 4d^{10}\ 5p^6\ 6s^2\ 4f^{14}$

(b) [Kr] $5s^1\ 4d^{10}\ 5p^6\ 6s^2\ 4f^{14}$

(c) [Kr] $5s^2\ 4d^{10}\ 5p^6\ 6s^2\ 4f^{13}\ 5d^1$

(d) [Kr] $5s^2\ 4d^{10}\ 5p^6\ 6s^1\ 4f^{14}\ 5d^1$

Q 24. What is the standard reduction potential (in volts) for the half-reaction:

$Cu^{2+}(aq) + 2e^{-} \rightarrow Cu(s)$?

(a) +0.34 V (b) -0.34 V (c) +0.76 V (d) -0.76 V

Q 25. Which of the following compounds exhibits geometric isomerism?

(a) 2-butene (b) 1-butene (c) Ethene (d) Propene

Q 26. In a reaction, 4 moles of A react with 3 moles of B to give 2 moles of C and 2 moles of D. What is the balanced chemical equation?

(a) $4A + 3B \rightarrow 2C + 2D$ (b) $2A + 3B \rightarrow C + D$

(c) $A + B \rightarrow C + D$ (d) $4A + 3B \rightarrow 4C + 4D$

Q 27. Which of the following is a Lewis base?

(a) HCl (b) H_2O (c) NH_3 (d) H_2SO_4

Q 28. What is the shape of the methane (CH_4) molecule?

(a) Tetrahedral (b) Linear (c) Trigonal planar (d) Octahedral

Q 29. What is the common name for H_2O_2?

(a) Hydrogen peroxide (b) Hydronium oxide

(c) Hydrogen dioxide (d) Hydrous peroxide

Q 30. Which of the following compounds is an example of an aldehyde?

(a) Acetone (b) Ethanal (c) Propanone (d) Methanoic acid

Q 31. How many stereoisomers are possible for a molecule with two chiral carbon atoms?

(a) 2 (b) 3 (c) 4 (d) 8

Q 32. What is the pH of a solution with a hydrogen ion concentration of 1×10^{-8} M?

(a) 2 (b) 4 (c) 6 (d) 8

Q 33. Which of the following elements does not have any stable isotopes?

(a) Bismuth (Bi) (b) Technetium (Tc)

(c) Uranium (U) (d) Thorium (Th)

Q 34. What is the IUPAC name for the compound $CH_3CH(Cl)CH_2CH_3$?

(a) 1-Chlorobutane (b) 2-Chlorobutane

(c) 1-Chloropentane (d) 2-Chloropentane

Q 35. Which type of electromagnetic radiation has the highest energy?

(a) Gamma rays (b) Ultraviolet rays

(c) X-rays (d) Infrared rays

Q 36. What is the molecular geometry of a molecule with a central atom surrounded by four bonded pairs and no lone pairs?

(a) Tetrahedral (b) Trigonal planar

(c) Linear (d) Bent

Q 37. What is the electron configuration of a chromium (Cr) atom?

(a) $[Ar]\ 4s^2\ 3d^4$ (b) $[Ar]\ 4s^1\ 3d^5$

(c) $[Ar]\ 4s^2\ 3d^5$ (d) $[Ar]\ 4s^2\ 3d^{10}\ 4p^6$

Q 38. Match the substances in Column I with their corresponding uses in Column II.

Column I	Column II
$CH_3(CH_2)_{10}CH_2OSO^{3-}Na^+$	Cationic detergents
$[CH_3(CH_2)_{15}N(CH_3)^{2-}CH_3]^+Br^-$	Non-ionic detergent
$CH_3(CH_2)_{16}COO(CH_2CH_2O)\ nCH_2CH_2OH$	Soap
$C_{17}H_{35}COONa$	Anionic detergent

(a)(A) - (iii), (B) - (ii), (C) - (iv), (D) - (i)

(b)(A) - (ii), (B) - (iv), (C) - (i), (D) - (iii)

(c)(A) - (i), (B) - (iii), (C) - (iv), (D) - (ii)

(d)(A) - (iv), (B) - (i), (C) - (ii), (D) - (iii)

Q 39. **Assertion:** The process of solubility of any gas in any liquid is exothermic.

Reason: All gases are highly soluble in any liquid.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Read the passage below and answer the following questions:(Q 40. – Q 42.)

Ozone is an unstable, dark blue diamagnetic gas. It absorbs the UV radiation strongly, thus protecting the people on earth from the harmful UV-radiation from the sun. The use of chlorofluorocarbon (CFC) in aerosol and refrigerator and their subsequent escape into the atmosphere, is blamed for making holes in the ozone layer over the Antarctica. Ozone acts as a strong oxidising agent in acidic and alkaline medium. For this property, ozone is used as a germicide and disinfectant for sterilizing water. It is also used in laboratory for the ozonolysis of organic compounds and in industry for the manufacture of potassium permanganate, artificial silk, etc.

Q 40. Which property of ozone makes it a valuable tool for sterilizing water?

a) Its dark blue colour

b) Its strong absorption of UV radiation

c) Its stability in the atmosphere

d) Its ability to react with metals

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Q 41. What is the main cause of the holes in the ozone layer over Antarctica?

a) Natural variations in atmospheric composition

b) Emissions of greenhouse gases

c) Release of chlorofluorocarbons (CFCs)

d) Volcanic activity in the region

Q 42. Name one industrial application of ozone.

a) Production of synthetic polymers

b) Sterilizing water

c) Manufacturing of pharmaceuticals

d) Generation of electricity

Q 43. Match the Column:

Column I	Column II
A. Photosynthesis	A. Cell organelle
B. Mitochondria	B. Cellular respiration
C. Ribosome	C. Protein synthesis
D. Nucleus	D. Genetic material

Options:

a) A-C, B-D, C-A, D-B

b) A-D, B-C, C-A, D-B

c) A-C, B-D, C-B, D-A

d) A-D, B-C, C-B, D-A

Q 44. **Assertion:** The process of photosynthesis is an endothermic reaction.

Reason: Photosynthesis requires energy from sunlight to convert carbon dioxide and water into glucose and oxygen.

a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

c) The assertion is correct, but the reason is incorrect.

d) Both the assertion and reason are incorrect.

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Read the passage below and answer the following questions:(Q 40. – Q 42.)

The Earth's climate system is highly complex and influenced by various factors. One of the key contributors to climate change is the increase in greenhouse gas emissions, primarily carbon dioxide and methane, from human activities such as burning fossil fuels and deforestation. These gases trap heat in the Earth's atmosphere, leading to a rise in global temperatures. This phenomenon, known as the greenhouse effect, has far-reaching impacts on weather patterns, sea levels, and ecosystems.

Additionally, feedback loops can amplify the effects of climate change. For example, as polar ice melts due to higher temperatures, it reduces the Earth's albedo, causing more sunlight to be absorbed rather than reflected back into space. This accelerates warming and further ice melt, creating a self-reinforcing cycle.

Q 45. What is one of the key factors contributing to climate change?

a) Volcanic eruptions

b) Increase in greenhouse gas emissions

c) Depletion of the ozone layer

d) Natural variations in solar radiation

Q 46. What are the primary greenhouse gases mentioned in the passage?

a) Carbon monoxide and nitrogen dioxide

b) Carbon dioxide and methane

c) Oxygen and nitrogen

d) Sulphur dioxide and ozone

Q 47. How do greenhouse gases affect the Earth's atmosphere?

a) They deplete the ozone layer.

b) They cause acid rain.

c) They trap heat in the atmosphere.

d) They increase the level of oxygen.

Q 48. What is the greenhouse effect and how does it contribute to climate change?

a) The trapping of heat in the Earth's atmosphere, leading to a rise in global temperatures. It accelerates climate change.

b) The reflection of sunlight from the Earth's surface, preventing excessive heating. It slows down climate change.

c) The absorption of carbon dioxide by plants, reducing the greenhouse effect. It mitigates climate change.

d) The increase in volcanic activity, releasing greenhouse gases. It exacerbates climate change.

Q 49. How does the melting of polar ice contribute to a self-reinforcing cycle of warming?

a) It increases the albedo, reducing the absorption of sunlight.

b) It leads to higher sea levels, causing more cloud cover.

c) It releases aerosols into the atmosphere, cooling the planet.

d) It enhances the reflection of greenhouse gases, preventing further warming.

Q 50. What human activities are mentioned as significant contributors to greenhouse gas emissions?

a) Deforestation and agriculture

b) Solar energy production and wind power

c) Ocean conservation and marine life protection

d) Geothermal energy extraction and nuclear power generation

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CHEMISTRY

Sample Paper 4

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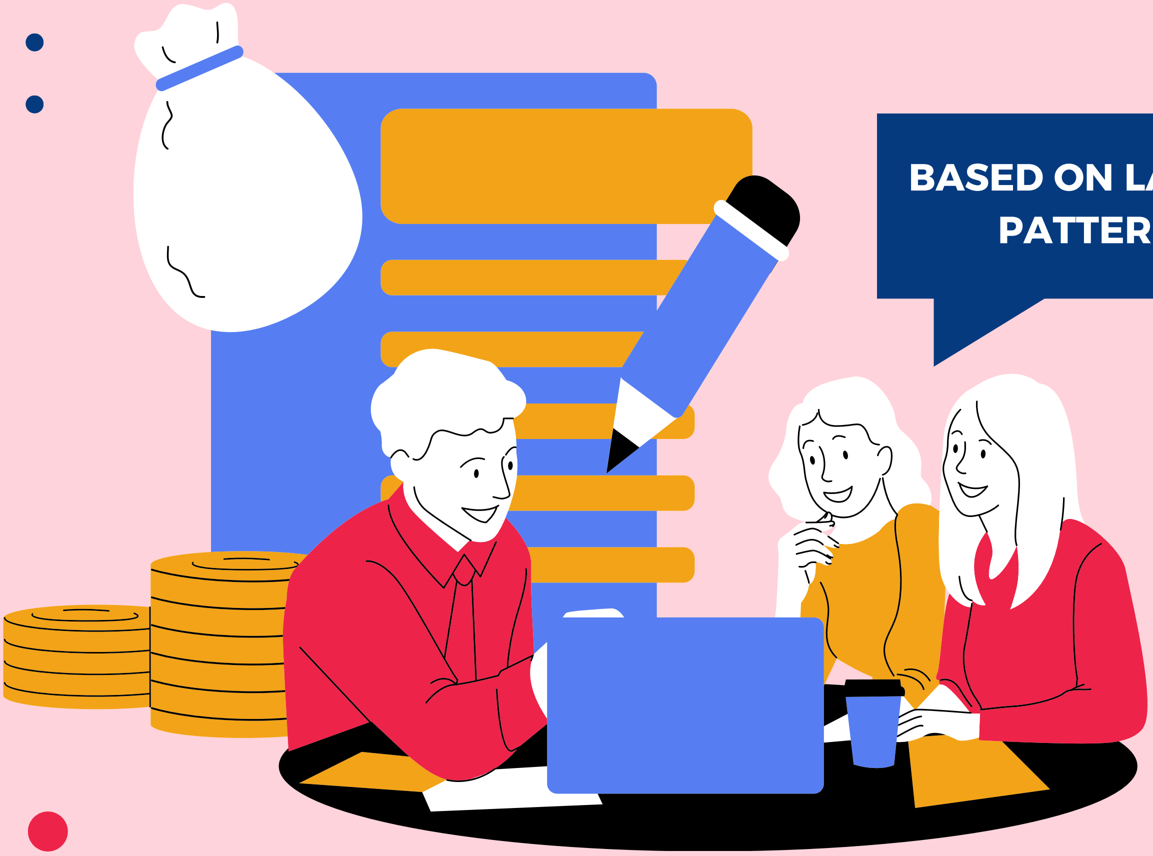

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CUET PRATICE PAPER

04

Q.1: Which species occupy the lattice points of a crystal of hydrogen iodide?

(a) HI molecules

(b) H atoms and I atoms

(c) H^+ cations and I^- anions

(d) H_2 molecules and I_2 molecules

Q.2: How many octahedral voids are there per atom in a cubic close-packed structure?

(a) 1

(b) 3

(c) 2

(d) 4

Q.3: Which of the following compounds is not ferroelectric?

(a) KH_2PO_4

(b) $K_4[Fe(CN)_6]$

(c) Rochelle salt

(d) $BaTiO_3$

Q.4: What is the percentage of solute in the resulting solution obtained by mixing 300g of a 30% solution and 200g of a 20% solution by weight?

(a) 50%

(b) 26%

(c) 62%

(d) 32%

Q.5: Which of the following pairs form a minimum boiling azeotrope?

(a) aniline + acetone

(b) acetic acid + pyridine

(c) HCl + water

(d) cyclohexane + ethanol

Q.6: At 300 K, two pure liquids A and B have vapor pressures of 150 mm Hg and 100 mm Hg, respectively. In an equimolar liquid mixture of A and B, what is the mole fraction of B in the vapor mixture at this temperature?

(a) 0.6

(b) 0.5

(c) 0.8

(d) 0.4

Q.7: If 500 mL of a 4.0 M aqueous solution of NaCl is electrolyzed, leading to the evolution of chlorine gas at one of the electrodes, what is the total charge required for complete electrolysis?

(a) 96500 C (b) 24125 C (c) 48250 C (d) 193000 C

Q.8: What is galvanization?

(a) zinc plating on aluminum sheet

(b) zinc plating on iron sheet

(c) iron plating on zinc sheet

(d) aluminum plating on zinc sheet

Q.9: The redox reaction Zn (s) + Cu^{2+} (aq) → Zn^{2+} (aq) + Cu(s) is used in which type of cell?

(a) Galvanic cell (b) Daniell cell (c) Voltaic cell (d) All of these

Q.10: In which scenario can the rate law not be determined from a balanced chemical equation?

(a) reverse reaction is involved

(b) it is an elementary reaction

(c) it is a sequence of elementary reactions

(d) Both (a) and (c)

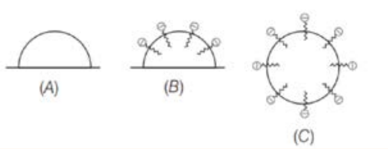
Q.11: For a first order reaction with a rate constant of 2303×10^{-3} S^{-1}, how long does it take for 40 g of the reactant to reduce to 10 g? (Given that $\log10_2=0.3010$)

(a) 230.3 s (b) 301 s (c) 2000 s (d) 602 s

Q.12: If 99% completion of a first order reaction takes 32 min, how long will it take for 99.9% completion of the reaction?

(a) 48 min (b) 52 min (c) 56 min (d) 44 min

Q 13. Figure ‘C’ represents the structure of:



(a) aggregated colloids

(b) macromolecular colloids

(c) Both (a) and (b)

(d) multimolecular colloids

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Q.14: What device is used to precipitate smoke?

(a) Cottrell precipitator
(b) colloidal precipitator
(c) natural precipitator
(d) Planck’s precipitator

Q.15: Provide examples of substances that belong to the w/o type emulsion.

(a) Butter and cream
(b) o/w type emulsion
(c) Both (a) and (b)
(d) None of these

Q.16: Identify a mineral primarily composed of iron.

(a) Malachite
(b) Cassiterite
(c) Pyrolusite
(d) Magnetite

Q.17: Which metals are commonly found in sulphide ores?

(a) Ag, Cu and Pb
(b) Ag, Cu and Sn
(c) Ag, Mg and Pb
(d) Al, Cu and Pb

Q.18: What occurs in the electrolytic refining method?

(a) The impure metal is made to act as anode.

(b) A strip of the pure metal is used as cathode.

(c) Anode and cathode are kept in a suitable electrolytic bath containing soluble salt of the same metal.

(d) All of the above are true.

Q.19: Among the listed hydrides, which one has the lowest boiling point?

(a) PH_3
(b) AsH_3
(c) SbH_3
(d) NH_3

Q.20: Which oxide is known for its amphoteric nature?

(a) Cl_2O_7
(b) Na_2O
(c) N_2O
(d) Al_2O_3

Q.21: Name some applications of dinitrogen gas.

(a) Preservation of biological materials and food items

(b) Production of inert atmosphere in copper and steel industry

(c) In the preparation of explosives

(d) Etching of metals

Q.22: Among the options, which element has the minimum third ionisation enthalpy?

(a) Mn (b) Ni (c) Co (d) Fe

Q.23: In terms of compound formation, how do actinoids resemble the lanthanoids?

(a) +3 state (b) +4 state (c) +5 state (d) +2 state

Q.24: How are dichromates typically prepared?

(a) by the fusion of chromite ore with sodium carbonate

(b) by the fusion of chromite ore with potassium carbonate

(c) Both (a) and (b)

(d) Neither (a) nor (b)

Q.25: How many ions are formed upon the dissociation of the complex [Co(NH3)6]Cl3?

(a) 3 (b) 2 (c) 5 (d) 4

Q.26: Provide an example of a sigma bonded organometallic compound.

(a) ruthenocene (b) Grignard's reagent

(c) ferrocene (d) cobaltocene

Q.27: What is the antidote used for lead poisoning?

(a) white of an egg (b) cis-platin

(c) nickel (d) EDTA

Q.28: Which of the following is an example of a vic-dihalide?

(a) Dichloromethane (b) 1,2-dichloroethane

(c) Ethylidine chloride (d) Allyl chloride

Q.29: How would you classify the nature of KCN and AgCN compounds?

(a) Ionic and covalent (b) Ionic and ionic

(c) Covalent and ionic (d) Covalent and covalent

Q.30: Which substance is used to prepare alkyl chloride in the presence of alcohol?

(a) H_2SO_4 (b) HCl solution (dilute)

(c) dry HCl gas (d) None of these

Q.31: When phenols undergo cleavage of the C—O bond, which element is commonly used?

(a) Na (b) K (c) Zn (d) Ca

Q.32: Arrange hydrogen halides in order of reactivity with ether:

(a) HBr > HI > HCl (b) HCl > HBr > HI

(c) HI > HBr > HCl (d) HCl > HI > HBr

Q.33: In fermentation, the activity of zymase is hindered if the alcohol concentration exceeds:

(a) 5% (b) 7% (c) 10% (d) 14%

Q.34: Carbonyl compounds can be found in:

(a) fabrics (b) flavoring (c) plastics and drugs (d) All of these

Q.35: Which compound yields an orange-red precipitate with 2,4-DNP reagent?

(a) Acetamide (b) Dimethyl ether (c) Butanone (d) Propylbutanoate

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Q.36: Which acid finds use in rubber, textile, dyeing, leather, and electroplating industries?

(a) Hexanedioic acid
(b) Ethanoic acid
(c) Methanoic acid
(d) Sodium benzoate

Q.37: What are the products formed when primary aliphatic amines react with nitrous acid at room temperature?

(a) R NO_2
(b) ROH
(c) Both (a) and (b)
(d) None of these

Q.38: Coupling reaction exemplifies:

(a) nucleophilic addition reaction.
(b) nucleophilic substitution reaction.
(c) electrophilic substitution reaction.
(d) electrophilic addition reaction.

Q.39: What is the chemical formula of Heinsberg’s reagent?

(a) HNO_2
(b) $NaOH^{+}CaO$
(c) $C_6H_5SO_2Cl$
(d) CH_3CONH_2

Q.40: Invert sugar is a blend of:

(a) D-glucose + D-fructose
(b) L-glucose + D-fructose
(c) L-glucose + D-glucose
(d) L-glucose + L-glucose

Q.41: Among the options, which one is not a hormone?

(a) Insulin
(b) Endorphins
(c) Norepinephrine
(d) Thymine

Q.42: Identify the water-soluble vitamin:

(a) vitamin C
(b) vitamin D
(c) vitamin E
(d) vitamin K

Q.43: Buna-S belongs to which category of polymers?

(a) natural polymer
(b) synthetic polymer
(c) semi-synthetic polymer
(d) None of these

Q.44: What is the biodegradable polymer that can be produced from glycine and amino caproic acid?

(a) nylon-2-nylon-6 (b) PHBV (c) buna-N (d) nylon-6, 6

Q.45: Among the types of polythene, which one is chemically inert, tough, and hard?

(a) HDP (b) LDP (c) Both (a) and (b) (d) None of these

Q.46: Where are the receptor proteins located?

(a) DNA (b) cell membrane (c) cytoplasm (d) RNA

Q 47: Match column A with Column B:

Column A	Column B
1. Phenols show the cleavage of C— O bond with	A. Na
2. The order of reactivity of hydrogen halides with ether is as follows:	B. HBr > HI > HCl
3. The action of zymase is inhibited during fermentation if the percentage of alcohol formed exceeds	C. 14%
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5. Which of the following compounds produces an orange-red precipitate with 2, 4-DNP reagent?	E. Acetamide

Q 48: **Assertion:** Invert sugar is a mixture of D-glucose and D-fructose.

Reasoning: Invert sugar is produced by the hydrolysis of sucrose, resulting in the formation of equal parts of D-glucose and D-fructose.

Options:

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Passage-Based Questions:

In the field of polymer chemistry, Buna-S is recognized as a significant synthetic polymer. It is a copolymer of butadiene and styrene, widely used for its high resilience and resistance to abrasion. Buna-S is commonly employed in tire manufacturing due to its durability and elasticity.

Q 49: Which monomers are involved in the formation of Buna-S?

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(b) Styrene and butadiene

(c) Ethylene and propylene

(d) Acrylonitrile and vinyl acetate

Q 50: What are the primary characteristics of Buna-S that make it suitable for tire production?

(a) High resilience and resistance to abrasion

(b) Transparency and electrical conductivity

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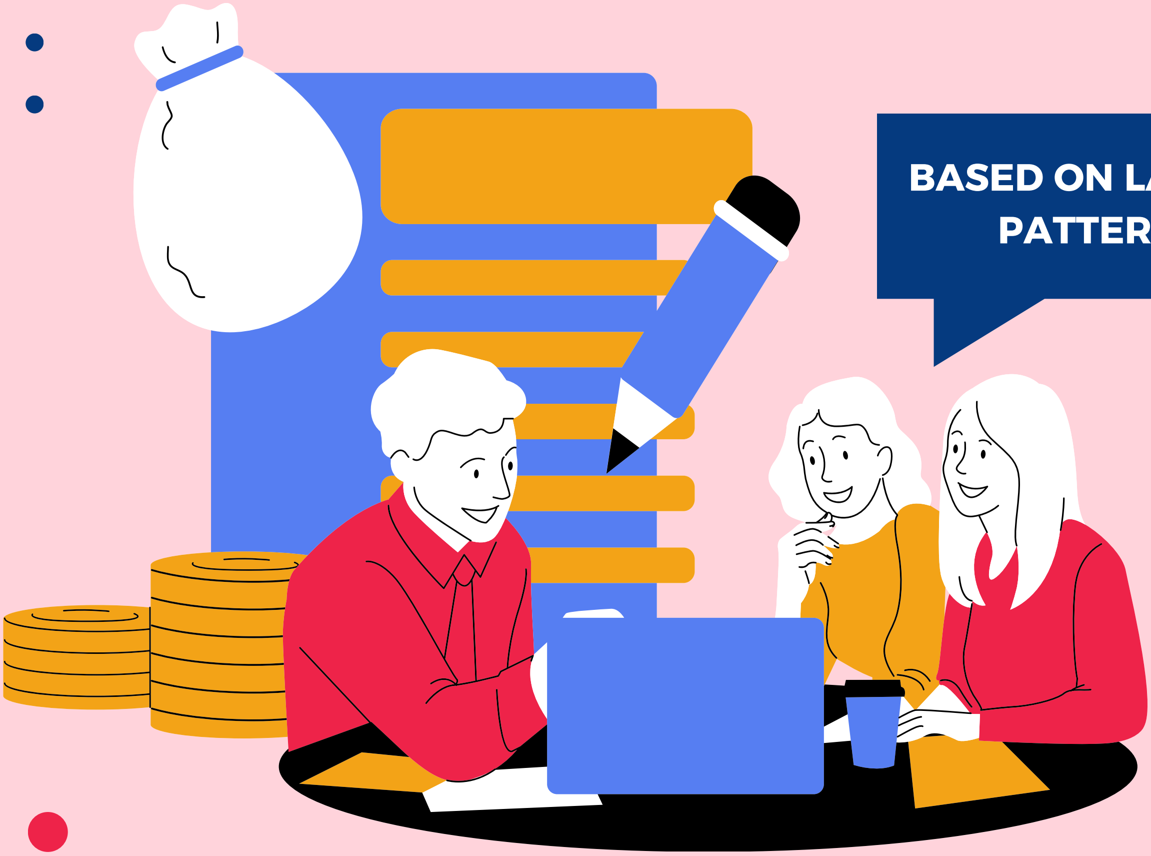

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05

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Passage-Based Questions (12-15)

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4. Carbonyl compounds are the constituents of	D. All of these
5. Which of the following compounds produces an orange-red precipitate with 2, 4-DNP reagent?	E. Acetamide

Options:

A. 1-D, 2-B, 3-C, 4-D, 5-E
B. 1-A, 2-C, 3-D, 4-E, 5-B
C. 1-B, 2-A, 3-D, 4-E, 5-C
D. 1-A, 2-B, 3-C, 4-E, 5-D

Q.17: **Assertion**: Invert sugar is a mixture of D-glucose and D-fructose.

Reasoning: Invert sugar is produced by the hydrolysis of sucrose, resulting in the formation of equal parts of D-glucose and D-fructose.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Q.17: **Assertion:** Buna-S belongs to the category of synthetic polymers.

Reasoning: It is a copolymer of butadiene and styrene, which are synthetic monomers.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Q.18: **Assertion:** Nylon-2-nylon-6 is an example of a biodegradable polymer.

Reasoning: It can be produced from glycine and amino caproic acid, which are naturally occurring compounds.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

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Q.19: **Assertion:** HDP is a type of polythene that is chemically inert, tough, and hard.

Reasoning: High-density polyethylene (HDP) is known for its excellent chemical resistance and strength.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Q.20: **Assertion:** Receptor proteins are located in the cell membrane.

Reasoning: Receptor proteins play a key role in cell signaling and are embedded in the cell membrane.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Q.21: **Assertion:** Food preservatives prevent spoilage of food due to microbial growth.

Reasoning: The most commonly used food preservative, C6H5COONa, is effective in inhibiting microbial growth.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

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Q.22: **Assertion:** Noradrenaline is a neurotransmitter.

Reasoning: Noradrenaline is a chemical messenger in the nervous system, transmitting signals between nerve cells.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Q.23: **Assertion:** Europium (Eu) is a lanthanoid that does not occur naturally.

Reasoning: Europium is a rare earth element and is typically found in minerals with other lanthanides.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Q.24: **Assertion:** In fermentation, the action of zymase is hindered if the alcohol concentration exceeds 14%.

Reasoning: High concentrations of alcohol can denature enzymes like zymase, reducing their activity.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

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Q.25: **Assertion:** Coupling reaction exemplifies electrophilic substitution reaction.

Reasoning: In the coupling reaction, an aromatic diazonium salt is coupled with an activated aromatic compound through electrophilic substitution.

(a) Both the assertion and reason are correct, and the reason is the correct explanation of the assertion.

(b) Both the assertion and reason are correct, but the reason is not the correct explanation of the assertion.

(c) The assertion is correct, but the reason is incorrect.

(d) Both the assertion and reason are incorrect.

Q 26. Which of the following is a macromolecular colloid?

A. Starch
B. Smoke
C. Gold sol
D. Milk

Q 27. The compound that does not exist as discrete molecules is:

A. S_8
B. P_4
C. Cl_2
D. H_2O

Q 28. The reaction of an alcohol with a carboxylic acid to form an ester is an example of:

A. Elimination reaction
B. Substitution reaction
C. Condensation reaction
D. Addition reaction

Q 29. In the reaction \(2A + B \right arrow C + D\), if the concentration of B is doubled, how will the rate change?

A. The rate will double
B. The rate will remain the same
C. The rate will be halved
D. The rate will quadruple

Q 30. Which of the following compounds is an aldehyde?

A. Acetone
B. Formaldehyde
C. Ethanol
D. Acetic acid

Q 31. The process of conversion of a solid directly into a gas is called:

A. Sublimation
B. Fusion
C. Vaporization
D. Evaporation

Q 32. Which of the following elements is a noble gas?

A. Neon
B. Sodium
C. Nitrogen
D. Nickel

Q 33. The product formed when ethene undergoes addition with bromine is:

A. 1,2-dibromoethane
B. 1,1-dibromoethane
C. Ethanol
D. Ethanal

Q 34. The compound that acts as a reducing agent is:

A. $K_2Cr_2O_7$
B. $KMnO_4$
C. H_2SO_4
D. H_2O_2

Q 35. Which of the following is an example of a colligative property?

A. Boiling point elevation
B. Hydrolysis
C. Oxidation
D. Polymerization

Q 36. Which of the following compounds exhibits resonance?

A. Benzene
B. Cyclohexane
C. Toluene
D. Ethylbenzene

Q 37. In a reaction, 2 moles of A react with 1 mole of B to produce 3 moles of C. If the rate of disappearance of A is 0.1 M/s, what is the rate of appearance of C?

A. 0.2 M/s
B. 0.3 M/s
C. 0.1 M/s
D. 0.4 M/s

Q 38. Which of the following statements is true about catalysts?

A. Catalysts increase the activation energy of a reaction.
B. Catalysts are consumed during the reaction.
C. Catalysts alter the equilibrium constant of a reaction.
D. Catalysts provide an alternative reaction pathway with lower activation energy.

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Q 39. The compound CH3CH2OH can act as both a Lewis base and a Lewis acid. This property is known as:

A. Isomerism
B. Tautomerism
C. Amphoterism
D. Resonance

Q 40. Which of the following statements is true about the pKa value of an acid?

A. A higher pKa indicates a stronger acid.
B. A lower pKa indicates a stronger acid.
C. The pKa value is not related to the strength of an acid.
D. A pKa value of 7 indicates a strong acid.

Q 41. Which of the following compounds exhibits geometric isomerism?

A. 1,2-dichloroethene
B. 1,2-dibromoethene
C. 1,2-dimethylcyclohexane
D. 1,2-dimethylbenzene

Q 42. The molarity (M) of a solution is defined as:

A. Moles of solute per kilogram of solvent
B. Moles of solute per liter of solution
C. Moles of solvent per liter of solution
D. Moles of solute per gram of solvent

Q 43. Which of the following elements is most likely to form multiple oxidation states?

A. Lithium (Li)
B. Sodium (Na)
C. Phosphorus (P)
D. Argon (Ar)

Q 44. The reaction A → B follows first-order kinetics. If the initial concentration of A is 1.0 M and the half-life of the reaction is 10 minutes, what will be the concentration of A after 30 minutes?

A. 0.25 M
B. 0.125 M
C. 0.5 M
D. 0.0625 M

Passage-Based Questions (46-50)

In the field of organic chemistry, the concept of chirality plays a pivotal role. Chiral molecules are non-superimposable mirror images of each other, much like a person's left and right hand. This property has significant implications in pharmaceuticals, where enantiomers of a drug may have drastically different effects on the body.

Consider the example of thalidomide, a drug prescribed to pregnant women in the late 1950s and early 1960s to alleviate morning sickness. Thalidomide exists as a pair of enantiomers, one of which is an effective sedative, while the other causes severe birth defects. Tragically, due to a lack of understanding of chirality at the time, both forms were used without discrimination, resulting in a medical disaster.

Q 46. What property distinguishes chiral molecules from achiral molecules?

(a) They have identical chemical structures.

(b) They are mirror images that cannot be superimposed.

(c) They possess the same biological activity.

(d) They are not affected by pharmaceutical applications.

Q 47. According to the passage, what happened due to the lack of understanding of chirality in the case of thalidomide?

(a) Both forms of thalidomide were used indiscriminately.

(b) Only one form of thalidomide was prescribed to pregnant women.

(c) Thalidomide was not prescribed to pregnant women.

(d) Thalidomide was banned for use during pregnancy.

Q 48. What analogy is used in the passage to describe chiral molecules?

(a) Left and right shoes.

(b) Day and night.

(c) Hot and cold.

(d) Tall and short.

Q 49. Which of the following best describes the effects of the two enantiomers of thalidomide?

(a) Both forms have the same effects on the body.

(b) One form is an effective sedative, while the other causes birth defects.

(c) One form is a painkiller, while the other is an antibiotic.

(d) Both forms have no significant effects.

Q 50. Why is understanding chirality crucial in the field of pharmaceuticals?

(a) It helps in creating more effective drugs.

(b) It allows for cheaper drug production.

(c) It ensures that all drugs are safe for use.

(d) It has no impact on the pharmaceutical industry.

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